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THE JOURNAL OF PHILOSOPHY
PSYCHOLOGY AND SCIENTIFIC METHODS

A STUDY OF PURPOSE. III

THE RÔLE OF PURPOSE IN NATURE

WE have seen that the concept of purpose is based on a certain conscious experience. The distinctive feature of the purposive experience is that the usual order of sequence between presentation and representation is inverted. The ideational experience which forms the first stage of purpose is termed *forethought;* the progress and fulfilment of the purpose are accompanied by a feeling of *fitness,* or by a contrary feeling if the fulfilment is impeded.

Our study of objective purpose indicates the presence of corresponding factors in behavior and growth. The analogue of forethought is an *anticipatory reaction;* the analogue of the fitness-sense is a judgment by the observer: when the outcome conforms to the scientist's ideal he judges it *fit,* when it fails to tally with this ideal he deems it *unfit.* On the basis of this similarity we are justified in extending the notion of purpose to certain biological phenomena, in which an inversion of temporal order is observed.

It remains to consider whether the category of purpose may be carried over into the inorganic sphere. Do any transformations or motions of physical things (apart from those pertaining to biological organisms) anticipate the future? This in turn suggests a still more fundamental question: Does science find any substantial indications that the constructive make-up of nature as a whole is purposive and that the succession of events in cosmic history constitutes a purposive series?

The scientist's problem is this: So far as we know at present the constitution of nature is quite empirical. It might have been quite different in many respects. The chemical elements might have been different, or the existing quantity of each might have been more or less than it actually is. The physical laws might have been different, or the grouping of masses into worlds and the material composition of these worlds might have been otherwise. If all physical nature is empirical, we may ask, (1) Does the actual constitution of nature give

evidence of a purposive *origin?* In other words, may we conclude on scientific grounds that its actual formation was anticipatory of the stages which evolution has undergone and will undergo? (2) Does the *evolution* process itself furnish evidence of anticipation and purpose? The problem of origin seems to involve an entelechy, since the beginning of the physicochemical series, if there was such a beginning, could scarcely itself be expressed in mechanistic terms. The problem of evolution is merely a generalization of the biological problem. If cosmic evolution as a whole *should* prove to be purposive, the purposive relation involved might be either entelechial or mechanistic.

We find, then, three fairly distinct problems confronting us: (1) The existence of purpose in *inorganic processes* similar to that which clearly occurs in the organic realm. (2) The purposive *origin of the universe.* (3) The purposive character of *cosmic evolution* as a whole.

It may be well at the outset to justify the attempt to examine these problems from a purely scientific standpoint. For, owing to the absence of any very clear empirical evidence on the subject, scientists are generally inclined to avoid the teleological problem as applied to inorganic nature. Some investigators hold that the problem is insoluble—that the answer is really "unknowable." Others insist that its solution transcends the bounds of scientific procedure and that an answer may only be obtained by non-scientific means, through the medium of philosophy and theology.

Neither of these seems the proper attitude for the scientist to take. (1) To hold that any phenomena are unknowable is distinctly unscientific. In many cases science has discovered new paths leading to the solution of seemingly insoluble problems. Spectral analysis revealed the chemical composition of distant stars, which had been assumed to be beyond the range of human knowledge. The most that the scientist may venture to say of any problem is that the answer is *unknown.* It is provincial if not paleolithic to declare any truth *unknowable.*

(2) To relegate the problem of teleology to philosophy and theology was a defensible attitude in pre-Darwinian times. There was then no scientific means of explaining the mechanism of purpose, whereas both of these branches claimed to possess a master-key to certain obscure problems of the universe. Now that biological science offers a definite explanation of purposive behavior, the relation of purpose to cosmic progress becomes an actual scientific problem. Whether or not the attempt prove successful in throwing new light on the trend of the universe, science seems called upon to investigate the problem of purpose to the very foundations according to its own methods.

Before beginning this study it would be well to recall once more the distinction between the mechanistic and vitalistic conceptions of purpose. The mechanist regards the purposive relation as *supplementing* the causal relation. Purposive phenomena, according to his view, are also causal phenomena. The succession of physicochemical processes in purpose is continuous, just as it is in pure causation. There is merely an *additional* relation between certain terms, which is the inverse of causal antecedence and consequence.

The vitalist, on the other hand, regards the purposive relation as *counteracting* or *superseding* the causal relation. According to his view there are in purposive phenomena one or more "uncaused" terms. Either the future in some way changes the present; or else some agency outside the series of events exerts a guiding influence upon their succession, so that events take a different course from that brought about by physical causation. The latter interpretation I understand to be Driesch's position. The supposed guiding agent, entelechy, may be part and parcel of the "material substance" or intimately associated with it; but one of its distinctive features is that it lies "outside the causal series."

It is somewhat difficult for a mind trained in the study of physical and chemical relations to picture such an entelechy or to understand the nature of its activity. But inasmuch as some earnest and well-trained observers do accept it, the hypothesis deserves serious consideration by scientific thinkers. Its validity should be determined by *evidence,* not by the test of *conceivability.* It is not sufficient to waive entelechy aside on the ground of inconceivability; for certain inconceivable hypotheses have ultimately worked their way into general scientific acceptance.[1]

The chief stumbling-block to the mechanistic interpretation of mental and biological purpose has been the potent, *directive* factor. We found reason to believe that this is only a psychomorphic adjunct to purpose. In the organic realm the mechanistic view, which rejects this factor, seems to be supported by the weight of evidence. The issue between vitalism and mechanism in the inorganic world should likewise be determined according to scientific evidence.

1. *Purpose in the Inorganic Processes.*—Our first problem is to determine whether any inorganic transformation gives evidence of possessing a purposive character. We shall base our inquiry upon the two distinctive factors discovered in purposive behavior, *anticipation* and *fitness,* and begin with an examination of the former.

(*a*) *Anticipation.*—Do inorganic activities in any way anticipate the future? Do they ever prepare for or refer to later situations?

[1] One leading aim of these papers is to urge a serious consideration of the entelechy hypothesis and its rejection on the evidence.

Physical events in general constitute an irreversible series—or, more exactly, a "non-reversing" succession. The motion of a material body tends to continue in the same direction indefinitely. When a moving body is deflected by some force or obstacle, it seldom retraces its course in precisely the opposite direction. When a mass of earth or rock disintegrates, its particles scatter far and wide and never return to reconstitute the original mass.

Certain physical phenomena indeed are *rhythmic;* this is particularly the case with simple motions, such as light and sound waves or the swing of a pendulum. The tides furnish an example of a rhythmic series on an unusually large scale. Closer examination, however, demonstrates that tidal rhythm is not a perfect reversal of events; winds and reefs often alter the course of the flow and transform tidal action into a succession of progressive changes. The same is true of the simpler rhythmic motions. Friction, atmospheric disturbances, and other influences modify sound vibrations and pendular movement.

Instances of *simple reversal* occur in the transformations of bodies from one state to another and in chemical activity. Water is transformed into steam or ice, and these bodies may return again to the liquid state. Chemical compounds are formed, and under certain conditions the compounds are transformed back into their elements. But the reversal seldom brings about an exact reconstitution of the original situation in every particular. Some of the ice evaporates before the rest is transformed into water. Part of the chemical compound unites with some other substance to form a new compound before the remainder has been resolved back into its elements.

A *cyclic* form of motion occurs in certain physical phenomena, such as the revolution and rotation of planets. But here, too, the recurrence of phases is imperfect. The rotation of the earth is subject to constant alterations; the earth's orbit is forever contracting. The more closely we examine nature, the less evidence do we discover of any complete reversal of serial order, or any exact cyclic repetition of events in the inorganic sphere. The general pattern of physical change appears to be a progressive, non-reversing series of transformations.

So far from raising an initial presumption against the teleological hypothesis, however, this general irreversibility of physical events is quite consistent with a purposive interpretation. For the reversal of events which characterizes purpose is not a complete retracing of the process step by step in the opposite direction. Anticipation is only an inversion of the order of *certain events* in the series. In the ordinary causal sequence represented by A, B, C, D . . . L, M, N, O, the event B is the usual antecedent of L, M, N, O. In purposive activity

certain of these events, M, N, come to be antecedents of B; the series becomes A, M, N, B, C, D . . . L, O. When the medusa, acting upon an olfactory stimulus (A), begins its food-getting reactions (M, N) before the food is grasped (B), this reversal of order stamps the act as purposive.

Are there indications of such anticipations in the inorganic world? Do we find any chemical or physical activities which begin before their antecedent conditions are completely established? Up to the present I have been unable to discover, outside of the organic sphere, any *unquestionable* example of anticipation. In popular language the sun "struggles" to pierce the clouds and pour its warm rays on the earth. Even were all the sun's rays concentrated on the earth, instead of an infinitesimal portion, it would be difficult to discern anything anticipatory in the "act."

The relation between clouds and rivers furnishes a less fanciful example. The sun's heat evaporates water from the sea, the temperature cools and precipitates rain, which gathers in springs and streams and passes at length into the great rivers. The formation of clouds, then, is in a way an anticipation of the river's flow. It serves to maintain the streams at a fairly constant level.

We may cite also the successive formation of strata in the earth's crust by precipitation of lime, basalt, and other substances. The older teleology would interpret the stages in the process as "means" to an "end,"—namely, the production of the solid earth. But does it involve real anticipation? Does not the causal relation describe it fully? In such cases does the future outcome add any new meaning to the successive stages of the process?

Certain mechanical devices of human origin manifest anticipation. The governor on a wheel keeps the speed constant. If the wheel begins to rotate faster the weight flies out and checks it; if the wheel slackens the weight is lowered and the diminished friction causes the speed to increase. There is no doubt but that the presence of the governor anticipates the irregularities of the wheel's motion. In certain motor engines immediately after combustion a valve opens through which the waste products pass out. The opening of the valve is anticipatory to the discharge.

Numerous examples of this sort might be mentioned, but they are scarcely relevant here, since they all originate in the activities of human organisms. They do serve, however, to demonstrate one fact, —namely, that mechanistic processes *may* fall into the purposive type. One would scarcely attribute a resident entelechy to the regulator. On the other hand, in all these cases the purposive type of activity is built up through the interaction of organisms with these inorganic bodies. The inorganic bodies do not of themselves assume

the purposive type of activity. Clerk-Maxwell suggested that a guiding "demon" might enable heat to pass from a colder to a warmer body; but he pointed out at the same time that the heat activity does not of itself accomplish this reversal.

In living matter we find abundant instances of anticipation, as already indicated. It should be noticed also that in the course of evolution, taken as a whole, so-called intermediate forms appear—rudimentary organs and transitional species,—which seem explicable only through references to other forms which appear later. Anticipation is so marked a characteristic of biological phenomena, that the most mechanistically inclined biologist finds it difficult to dispense altogether with teleological language in discussing growth and behavior. On the other hand, when we study the "behavior" of chemical elements, the evolution of the stellar universe, and the formation of the earth's crust, it is difficult to discover a single indisputable instance of anticipatory activity. Does this indicate that anticipation is a phenomenon which belongs exclusively to biological organization?

I am not sure that so sweeping a conclusion is justified. (1) The anticipatory behavior of organisms depends on complex structure. Outside of the organic realm we have little opportunity to observe very complex colloidal compounds. If anticipatory activity depends upon *complexity* (and upon *organization* in the broad sense of orderly complexity), is there any but negative evidence to warrant us in limiting the sphere of anticipation to *biological* organization, *i. e.*, to the orderly complexity of carbon compounds?

(2) It appears from observation of organisms that the greater the degree of organization, the further-reaching and more detailed is the anticipation. This in itself would lead us to expect only rare and crude instances, if any, among simple inorganic phenomena.

(3) The example of the mechanical governor would seem to refute the assumption; for a crude speed regulator might conceivably come into existence by some fortuitous combination of substances. A natural dam may approximate a type of water-gauge.[2] The complex interworking of cloud-formation and river-flow may also serve as an argument for anticipation in the inorganic sphere. One single exception destroys the generalization.

(*b*) *Fitness.*—In the activity of organisms the fitness factor is a judgment by the observer that the outcome of the activity conforms to a type or to a general ideal. The dog's food-getting reaction is fit when it results in his capturing and devouring the prey. Or, in the

[2] These two illustrations were suggested by Professor R. S. Lillie's reference to the safety-valve in his admirable paper on "Purposive and Intelligent Behavior" (this JOURNAL, XII., page 604). The first two parts of the present paper were completed and the third part outlined before the writer was acquainted with Professor Lillie's article.

broader aspect, it is fit when it serves to maintain the dog's life. From this broader viewpoint we would not judge the devouring act to be fit if the prey devoured is poisonous.

The physical sciences proceed on the assumption of uniformity. So far as conditions are the same the mechanical activity is exactly the same; and so far as they differ the activity does not conform to the assumed type—it is not "fit" in that sense. We are accustomed in experimental work to solve the question of conformity by mathematical criteria. Take the problem of the atomic weight of hydrogen in relation to oxygen. Based on O = 16, a number of independent tests give values for H varying between 1.0075 and 1.0085. The investigator assumes the average or median as type, and estimates the relative fitness of the particular tests according as they approach this standard.

The criterion of fitness may be used to determine the purposiveness of an activity where its anticipatory character is in doubt. For example, take the sequence of evaporation from the sea and the flow of rivers. If we regard a certain height of water in the river as the type, then a given amount of evaporation and rainfall leads to a fit outcome. A greater or lesser amount of evaporation is to this extent unfit. But how are we to determine the "standard" height of water? In animal behavior we found difficulty in setting particular norms, for the reason that behavior different from the norm was sometimes judged fitter than that which conformed. In the river-level problem it is far more difficult to select a norm. Is the norm a steady level, or an average level with fluctuations, or a progressive lowering of level as the stream cuts its way deeper into the bed? If the river breaks its banks and floods a marsh-land, is this outcome fitter or more unfit? It is difficult in studying such activities to form any solid judgment of fitness with reference to a particular norm.

How is it with general norms or ideals? The ultimate criterion of fitness in the organic sphere proved to be the maintenance of the individual life or the persistence of the phyletic chain. The nearest approach to this among inorganic phenomena is the maintenance of an object's form despite changes of substance. Thus a river maintains itself, although the water is constantly replaced by other water. There is a seductive analogy between this and the maintenance of organic life through all the creature's metabolic changes. If we consider the maintenance of water in river-beds as a general norm and the evaporation from the ocean as an anticipatory action, we may attach a judgment of greater or less fitness to the rainfall in wet and droughty seasons, respectively.

The scientific physiographer would probably adopt this interpretation. If physiography is a real science, it would seem possible to

extend the notion of purposive activity to such phenomena as these. We may even find in physiography examples of "adaptation"—that is, modifications which render the activity more fit.

A volcano builds itself up by means of its own activity. The lava which it throws out collects in a cone, while the continual passage of material from the inside keeps open a vent and maintains a funnel-shaped passage. This passage is lengthened more and more as the mountain grows higher. In the nature of the case more material flows to the base than collects at the summit, so that the sides of the volcano maintain a curved slope which forms a suitable incline for the flow of lava. The action at any moment is fit, but the modifications render it *more* fit. In other words, the activity "adapts" itself to each phase of the changing conditions.

Again, a river gradually wears away its bed. The swifter current in mid-stream makes that part deeper; the banks are cut down so as to give clearly marked limits to the channel. The general action of erosion is *anticipatory,* in that it prepares the river bed for the continued flow of the river. Each step in the erosive process is also an *adaptation;* it renders the river-bed more fit for the flow of the current.

Should activities of which the above are instances be included under the concept of purpose? From the physiographer's standpoint this extension of purpose is legitimate, for they bear the distinctive marks of purpose—anticipation and fitness. The biologist may object that the river and the volcano are not unitary things in the sense that organisms are units. But are not the cell and the organism also groups of particles from the physicist's standpoint and groups of atoms from the chemist's?

If biology has a right to adopt an arbitrary unit which suits its needs, can it refuse to recognize the right of another science to adopt the unit which *its* data justify? Each science is the best judge of its own requirements. The real question is whether physiography is a science—or rather, whether its data admit of scientific treatment. It would be difficult for the biologist to defend his own science against the physicist and at the same time combat the claims of physiography. I believe there is some ground, then, for extending the concept of fitness into the inorganic realm, though little progress has actually been made in this direction.

This extension, however, serves only to emphasize the mechanistic interpretation of purpose. For it is doubtful whether any scientific physiographer would seek to account for the process of river-maintenance and volcanic action by the directive agency of an entelechy.

We may conclude, then, that there are some few scientific indi-

cations of "purpose" in the inorganic realm, and that the evidence certainly precludes a sweeping denial of its *possibility* in that sphere. So far as the actual evidence goes, however, the indications favor the mechanistic interpretation rather than the vitalistic.

2. *Purposive Origin of the Cosmos.*—So far we have considered only specific types of inorganic activity. Quite a different problem arises when we examine the character of the *ultimate data* which compose the inorganic world. Do the make-up of atoms and electrons, their spatial relations and "forces," their modes of composition, their actual distribution, etc., indicate a preexisting "plan"? We have only the later terms of the series to go upon. If an anticipation stage existed, we have not observed it. I see no way of studying this phase of purpose from the standpoint of *anticipation;* our only avenue of approach, apparently, is from the side of *fitness.*

The question of *entelechy* stands on quite a different footing in the explanation of origins from its place in the explanation of changes. In the latter it seems to be wholly discredited. In the problem of origins, however, the issue between entelechy and mechanism is still open so far as our present survey is concerned. Even though there be no directive potency in consciousness or in organisms, a directive factor may prove requisite to account for the beginning of the things which are.

Certain writers have recently endeavored to reinstate the earlier cosmic teleology, and to demonstrate that the actual constitution of the universe is peculiarly harmonious, a conclusion which seems to indicate a preconceived design. For example, the existing range of temperature on the earth is favorable to rainfall, which produces the streams, which cause erosion, which renders the soil favorable for vegetation. Similarly they conclude that initial prevision is evidenced by the great abundance of those elements which are most important for the preservation of life. In each of these instances, as in almost all that are brought forward to sustain the contention, there is some reference to life. But the purpose here considered is not a biological act—it is rather the fitness of inorganic conditions to produce and maintain vital organization. Such examples of the peculiar fitness of inorganic conditions might be multiplied. Several writers have traced them out in great detail.[3]

There is, however, a fundamental scientific objection to this mode

[3] See especially the recent work by L. J. Henderson on "The Fitness of the Environment." Professor Henderson holds that the cosmic process is strictly mechanistic, but that there may be a tendency which works "parallel with mechanism without interfering with it" (p. 306)—this tendency being located "at the very origin of things, just before mechanism begins to act" (p. 308). It is interesting to note that Professor Henderson assigns teleology to a realm outside the domain of science (p. 311).

of reasoning. Admitting that inorganic conditions are peculiarly suitable to the maintenance of life as actually constituted, it may nevertheless be argued that under a different set of inorganic conditions a different type of organism might have arisen for which those alternative conditions would have proved just as favorable. It is not reasonable to infer design from the fitness of present conditions, unless at the same time we can show that any other conditions would have resulted in hopeless chaos. At present there are no means of demonstrating this. On the contrary we do find certain inorganic phenomena, such as the properties of silicon compounds, which suggest that on a planet where carbon was scarce a different type of organism might well have arisen based upon some other element.

The attempt to infer design from the peculiar fitness of actual physicochemical conditions rests mainly upon enumeration of particulars. In the interest of fairness the evidence for the other side should be presented. Unfortunately no one has undertaken, so far as I am aware, to enumerate systematically the points of *unfitness* which inhere in the actual constitution of matter, its properties, and its relations.[4] It is not easy for us to imagine a universe of other sorts of atoms with other properties and relations. The scientist may concede his own inability to picture things as they might be, without being at all convinced that they might not be different, and that the constitution of such hypothetical things might not be better fitted to secure an harmoniously working universe. In short, the arguments so far advanced for "peculiar fitness" lead merely to the meaningless conclusion that the fitness of things is what it is.

The attempt to read purpose into origins by such arguments as this is merely an extension of the vitalistic conception of purpose from the biological sphere to the problem of cosmic origins. At any given instant (it is argued) the position of events would "naturally" be so-and-so; but at certain critical moments entelechy steps in as a directing force and alters the "natural" sequence of phenomena. So too it is assumed that at the origin of things their constitution might have been this, that, or the other; an entelechy steps in and directs what they shall be. We have seen, however, that there is no empirical ground for the belief that at any instant a directing force alters the mechanistic course of events. Why then should the scientist carry this discredited notion over into the sphere of origins, about which he knows far less?

[4] According to all indications, in the actual physical universe the dissipation of energy will ultimately reduce any given world to a cold, solid mass, on which life as we know it will cease to exist. Surely this is a supremely *unfit* character in the constitution of things!

The philosopher will obtain scant hearing among scientists if, after conceding the mechanistic character of biological events, he attempts to smuggle entelechy in at the beginning of things. A notion accepted in one sphere may be carried over by analogy into another with some plausibility. But if it afterward prove false in the former sphere, one should demand independent evidence if it is to stand in the latter. If the action of a directing agency during the *course* of events is unsupported by evidence, there is no *a priori* ground for assuring such a directive agency at the *beginning* of events.

The present findings of science, however, indicate rather a world without beginning in time. If the succession of physical changes has proceeded from all time, there is surely no question of a directive agency at the beginning. The scientist will not go so far as to assert the *impossibility* or *inconceivability* of a beginning, or of an entelechy in that beginning. He will merely note the entire absence at present of evidence to support the hypothesis.

3. *Purpose in Cosmic Evolution.*—It remains for us to consider the relation of purpose to the progress of events in the universe taken as a whole—or rather in that fragment of time and space open to modern scientific observation. The notion of evolution in its broadest aspects covers the growth of stellar systems, the integration of single worlds like the earth, the chain of living species, and social organization. This dynamic concept is to-day firmly established in science. It points to a progressive change, rather than an ebb and flow of events—to new stages of organization and novel results attained in the course of history. The evolution concept *per se* involves nothing which may not be stated in purely causal terms. But the occurrence of anticipation and prevision in certain portions of the general system is definitely established. Can this notion of purpose be extended to the course of cosmic history regarded as a single interwoven plexus of events?

So far as the *vitalistic* interpretation of purpose is concerned, it is difficult to find any warrant for such an assumption. The facts in biology on which the notion of a directive entelechy are based have been shown to lend themselves readily to a mechanistic explanation. Inorganic phenomena require even less the support of an entelechial hypothesis. Natural selection seems an adequate substitute for prevision in the interpretation of organic evolution, and we find nothing in the processes of inorganic evolution which indicates the action of a directive force outside of the causal chain. Scientific evidence, then, leads clearly to the rejection of the entelechial assumption in interpreting the course of cosmic evolution.

There remains, however, the possibility of extending the *mechan-*

istic interpretation of purpose to the cosmic process. We have endeavored in these papers to work out a scientific conception of purpose which avoids the implication of a potent, directive agency. Purpose in the last scientific analysis implies only anticipation and fitness. Do we find evidence of these factors in the cosmic process as a whole?

The mechanistic standpoint is an attempt to explain organic phenomena in physicochemical terms. In so far as this attempt is successful, the gap between inorganic and organic processes is bridged. When, therefore, the mechanist comes to consider the rôle of purpose in the universe, his fundamental assumption makes it feasible for him to group the organic with the inorganic. That is to say, the mechanist finds no ground for setting organic phenomena off by themselves. He regards the entire course of evolution as a single graduated process.

The only scientific basis, in our present state of knowledge, for the extension of the category of purpose to the course of cosmic evolution seems to be the general orderly interweaving of natural processes in their mutual interplay, and their progress toward a preconceivable goal. The physical universe, even apart from organic life, is a cosmos, not a chaos. The uniformity of nature, the prevalence of the same chemical and physical "laws" throughout the vast extent of space and time which are within scientific observation, the conservation of energy, the wide reach of light, gravity, etc.,—all these empirical generalizations testify to a general unity of composition and unity of action in nature. There is present something more than fitness—there is evidence of *harmony* of all processes.

Science can not infer with certainty that this general harmony implies *anticipation*. But there is apparently a certain *trend of events* which may be noted even with our present limited knowledge. With the further advance of knowledge it seems likely that the direction of this trend will become more clearly evident. In other words, it seems possible that the fulfilment of the cosmic process may be anticipated or foreseen in human knowledge.

Unfortunately this type of prevision does not meet the conditions of purpose according to the mechanistic interpretation. For the anticipation of events implied in mental and biological purpose is a temporal inversion *in the series of events themselves*, not in a separate thought-series. Our thoughts, or their physical bases, form part of a world-wide causal sequence, it is true, but they constitute only a minute portion of the vast complex sequence which embraces the whole course of cosmic evolution. Without insisting too dogmatically on the parity between antecedent and consequent, we may nevertheless hesitate to call any individual man's knowledge a "prep-

aration'' for the vast future course of the world's evolutionary progress. The successive steps in the general cosmic evolution, according to all present scientific knowledge, do *not* anticipate future steps, in the sense of preparing for them. Whether an extension of knowledge will reveal any such preparatory or anticipatory action in the process itself, it is beyond the province of this study to suggest.

In the absence of direct evidence for *anticipation,* we can only point to a substitute conception, *trend.* There does appear to be a general trend of events toward more complex organization, better adaptation, and moral improvement. What we know of stellar evolution points to a trend in the direction of complexity and harmonious organization. The evidence from the organic world is far more significant. The trend of organic evolution appears to be a steady advance; the later forms are more complex, fitter, better, than the earlier. Despite the ''struggle for existence'' there is a general cooperation of action among species—an interworking of the several processes of multiplication, destruction, and variation. The organic world is apparently working out its own destiny in a well-rounded manner.

The real value of this evidence it is difficult to estimate accurately. One is prone to attach undue weight to particular phases of evolution. The appearance of plant life on the earth, the rise of man, the defeat of a barbarian horde, impress the student of certain sciences as being crucial events. They do not seem especially significant, however, when we consider the aeons of time and the vast stretches of the stellar universe. The only conclusion of universal importance which science yields in this matter is that there is a general trend of cosmic evolution ''upward.''

To the exact scientist, as Bertrand Russell suggests,[5] the evolution of biological forms seems trivial compared with the immutable laws of inorganic matter. The history of higher intelligence and social organization on one minute planet for some 10,000 solar years seems but a single tremor in the pulse of time. The conquests of Alexander or any other terrestrial event look small in perspective. On the other hand, from the standpoint of *values* the appearance on the scene of rational beings, capable of ethical judgments, seems to mark a tremendous leap in advance.

Allowing for the natural bias of both parties, I believe we may grant the existence of a ''trend'' of some sort in cosmic history, to which the judgment of ''harmony'' is attached. Harmony may be only a broader conception of *fitness,* but *trend* is not equivalent to anticipation or *preparation.* Unless the meaning of purpose be con-

[5] ''Our Knowledge of the External World as a Field for Scientific Method in Philosophy,'' pages 11 ff.

siderably revised, it does not seem applicable to the general course of cosmic events.

It is one thing to quibble over terms, and quite another matter to attach clear and definite meanings to the terms which are employed. We have endeavored to attach a definite scientific meaning to the vague popular notion of purpose. Our analysis fixed upon the "reversal of sequences" as the fundamental characteristic of scientific teleology, the adequacy of the inversion being estimated in the judgment of fitness. The notion of a *trend* appears to be somewhat different from this. It would only becloud the issue to include it under the idea of purpose. For this reason, while we may conclude, on the basis of empirical evidence, that "history" in its widest sense shows a *trend,* our present scientific knowledge does not indicate that it manifests a *purpose.* Whether scientific investigation will ultimately succeed in discovering a teleological character in cosmic evolution, is for the future to determine. We should reserve judgment till crucial evidence is at hand.

Up to the present, science has discovered only meager data for the extension of the purpose category below the organic realm. While the concept proves extremely useful in biology and psychology, the causal category is the all-important mode of interpreting inorganic phenomena. Philosophy and primitive science, starting as usual at the wrong end of the series, have read the higher into the lower. They have overestimated the importance of purpose in cosmic events, just as they have overestimated the importance of the kinesthetic factors in purpose itself. The voluntaristic philosophy of Schopenhauer and Nietzsche, the entelechial philosophy of Driesch, are but exaggerated instances of this widespread tendency.

Mechanistic science finds a place for teleology in the world. But the purpose which mechanistic scientists recognize is not the *entelechy* of the vitalist; it is a principle of transformation which cooperates with causation, not an efficient agent which plays havoc with causal transformation.

Summary

Our study of purpose covers three separate fields: the conscious experience, the "objective" biological phenomenon, and the rôle of purpose in the general scheme of nature. We considered the psychological problem first, since the notion of purpose is found to be based on a certain conscious experience.

1. *Purposive Consciousness.*—The distinctive feature of the purposive experience is the inversion of the usual time order of certain events. Representation precedes presentation, the general precedes the particular.

Our analysis of the purposive consciousness brought to light five factors. (1) *Forethought,* the most characteristic factor, is an idea or image which carries with it a reference to the future. (2) *Assent,* which attaches to every forethought, is based on certain kinesthetic memories. (3) *Potency-feeling,* the feeling of an efficient force in the forethought, is based on the kinesthetic sensations which accompany muscular tension in movement. (4) The *self-notion,* or personal reference in purposive acts, is based upon the kinesthetic data which attend all personal activity. (5) The *sense of fitness* accompanies the fulfilment of the forethought and certain intermediate steps; it is a judgment that the experience corresponds to the forethought. Its opposite form, the sense of unfitness, is a judgment of non-correspondence. This factor, like the first, is very characteristic of purposive experiences.

The three kinesthetic data—assent, potency-feeling, and self-notion—are incidental accompaniments. They have all acquired undue importance in the psychological analysis of purpose. In particular, the overestimation of the potency-feeling is responsible for the common theory that the forethought has power to effect its own fulfilment by an autonomic selection and guidance of events. It has led to unscientific and mystical interpretations of volition, which closer analysis fails to justify. The fiat is only assent reinforced by a feeling of dynamic efficiency.

2. *Purposive Activity.*—Our study of purposive activity in organisms included both behavior and growth. Purposive activity as observed in organisms is characterized by only two of the factors noticed in the conscious experience—*anticipation* or preparation, and *fitness* or adaptation.

(1) *Anticipation* is a real biological phenomenon. Behavior and growth are actually conditioned by the future as well as by the past. A later event is the basis of some earlier event, not merely its effect. That is, the usual temporal order of events observed in ordinary causal sequences is partly reversed in purposive activity. The embryo's growth has reference to the future adult state; a responsive act may begin before the situation to which it is a response is fully present.

Anticipatory behavior depends upon a set of mechanisms, especially the distant-receptors and the central nervous system. The phylogenetic acquisition of these mechanisms and their functions by organisms is sufficiently accounted for historically by chance variations and natural selection, since anticipation is generally beneficial to the creature.

(2) *Fitness,* the second factor, is not so much an observed phenomenon as a judgment by the observer. Scientists judge the fulfil-

ment of a purposive act by its correspondence with a type. In the final analysis a reaction or growth process is judged "fit" if it tends to prolong the individual's life or to preserve the species. An act or process which tends to end the creature's life or destroy the species is deemed "unfit." Between these extremes we find a graduated scale of fitness.

(3) The other factors which occur as accessories in the conscious experience of purpose have no counterpart in purposive activity. There is nothing in behavior or growth corresponding to the consciousness of "assent," "self," or "dynamic potency." Nevertheless these factors, particularly the sense of power in consciousness, have greatly influenced the scientific interpretation of purposive activity. They are largely responsible for the psychomorphic view of instinct and intelligence which characterized the earlier biology. The vitalist's entelechy is, in fact, an impersonation of these psychomorphic factors.

The extension of such notions as volition, indeterminism, and compulsion to the sphere of biological processes in the form of a guiding entelechy seems an assumption unwarranted by present evidence. The whole sequence of events in growth and behavior appears capable of explanation in mechanistic terms.

3. *Purpose in Nature.*—The rôle of purpose in the cosmos is a legitimate problem for science to face. (1) In the *inorganic sphere* there is no clear evidence of anticipation—that is, preparation—though a few facts, notably among physiographical processes, seem to indicate its presence. To these processes the judgment of fitness may be attached.

(2) When we consider the *origin* of the cosmos, the older purposive interpretation, founded upon entelechy, finds no support. For the entelechy theory rests upon a biological and psychological analogy, and scientific evidence in these two spheres is against the assumption on which the analogy rests. Entelechy, regarded as a potent, guiding agency, appears to be merely a psychomorphic element added to the notion of purpose. Without entelechy the very problem of origins vanishes, for science finds no other ground for assuming a beginning in the chain of natural events.

(3) Finally, if we seek for evidences of purpose in the general scheme of *cosmic history,* we find indications of a *trend,* but not of *purpose.* Science so far has observed no clear signs of anticipation in the general course of evolution, but only of a tendency toward greater complexity and harmonious interworking. What the future will discover remains to be seen. Present indications at least would lead us to judge that purpose is not a fundamental category in the scientific explanation of cosmic evolution.

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SOCIETIES

THE TWENTY-FOURTH ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

THE twenty-fourth annual meeting of the American Psychological Association was held in Chicago on December 28, 29, 30, at the University of Chicago. About one hundred were registered as in attendance and a somewhat larger number were present at the annual banquet and the president's address. Among the special features, in addition to the programme of papers, were the discussion of the relation of psychology, philosophy, science, and pedagogy in the academic curriculum; the report of the committee on the status of psychology in normal schools; the unusually full and well-arranged apparatus exhibit, in charge of Professor H. A. Carr; the address of the president, Professor John B. Watson; the annual dinner and smoker; the luncheon at Hull House, as the guests of Dr. William Healy; the visit to the Detention Home of the Cook County Juvenile Court; and the exceptional opportunities afforded for general sociability and acquaintance.

At the annual business meeting Professor Raymond Dodge was elected president of the association for the ensuing year, and Professors H. A. Carr and K. Dunlap were elected to the council. The various committees reported their activities during the year, and several administrative items, of interest only to members of the association, were considered. The committees on psychology and medicine and on prizes were discharged. The committee on the academic status of psychology reported a study of the teaching of psychology in normal schools. This report, prepared by Professors Margaret Washburn and Bird T. Baldwin, has been printed in full and copies were distributed at the business session. Professor Yerkes gave a brief account of the San Francisco meeting. Steps were taken to reduce the number of papers placed on future programmes and Professors Bentley, Whipple, and Ogden were appointed as programme committee. A committee on terminology was arranged for. Nineteen new members were elected.

The following resolution, presented by Professor Whipple, was adopted by the association:

WHEREAS, psychological diagnosis requires thorough technical training in all phases of mental testing, thorough acquaintance with the facts of mental development, and with the various degrees of mental retardation;

AND WHEREAS, there is evident a tendency to appoint for this work persons whose training in clinical psychology and acquaintance with genetic and educational psychology are inadequate;

Be it resolved, that this association discourages the use of mental tests for practical psychological diagnosis by individuals psychologically unqualified for this work.

The association was invited to hold its next meeting at Columbia University, and this invitation was accepted. It is intended at this meeting to celebrate the twenty-fifth anniversary of the association by appropriate special programme features.

At the apparatus exhibit were demonstrated an exposure apparatus (C. L. Hull), a chronoscope (K. Dunlap), a constructive ability test (T. L. Kelley), a recorder for tapping and a portable tachistoscope and memory apparatus (H. S. Langfeld), a new learning apparatus (W. H. Pyle), two spatial relations tests and a learning test (W. V. Bingham), peg form boards (J. E. W. Wallin), multiple choice apparatus (R. M. Yerkes), various instruments and charts (M. Bentley), and a class-room stop-watch (G. M. Whipple). C. E. Stoelting Company had on display numerous psychological instruments and materials and demonstrated many of these. J. F. Shepard exhibited blue prints of the new psychological laboratory at the University of Michigan and gave a detailed description of the plans.

The programme of papers comprised some seventy reports, with considerable informal discussion. Nearly one third of the papers were on the standardization and results of mental tests and their use in clinical, educational, and vocational psychology.

J. W. Hayes reported comparisons of the Binet scale, the Yerkes point scale, various selected tests, and school grading. R. M. Yerkes and C. Rossy reported progress on the formulation of a point scale for adolescents and adults, following the plan of the preadolescent point scale. R. Pintner has begun preliminary work on the construction of a scale of performance tests for deaf mutes and those with imperfect language. T. L. Kelley presented a constructive ability test, in which the manipulation of building blocks affords indications of various important traits in terms which admit of objective grading. W. H. Pyle, using a new device for testing learning capacity, finds that colored children studied have three fourths to four fifths the learning capacity of white children. E. S. Jones gave a detailed account of the standardization of certain familiar test blanks. He also reported from the Vocation Bureau of Cincinnati numerous correlations of mental measurements among themselves, with school grade, physique, average weekly earnings, and job tenure. The results suggested that, under the present haphazard methods of placement, mental measurements furnish but little basis on which to forecast either earnings or permanency of position during the first two years in industry. W. D. Scott reported correlations of 50 to 90 per

cent. between the results of mental tests of adults and (1) firm ratings of these adults for efficiency and (2) the later achievements of the individuals in the field, suggesting the immediate applicability of tests for vocational selection. K. T. Waugh described the results of mental tests of college students as freshmen and as seniors, exhibited devices for transforming measurements into comparable scales, and urged cooperative attention to the mental examination of college freshmen. Elsie Murray was not present and her paper on "Psychological Tests as Diagnostic of Certain Individual Differences in College Students" was omitted. Jean Weidensall reported progress in an investigation designed to establish mental and physical norms for law-abiding efficient saleswomen, waitresses, factory operators, and housemaids, in tests previously used with criminal women. Helen T. Woolley offered a series of norms for school children of the same age as the working children for whom norms have been published. The school children are superior in every respect. A scale combining the two groups is soon to be ready for use. H. H. Woodrow described and illustrated an association-frequency table for children, suggesting interesting differences in association reaction between children and adults. W. V. Bingham described a test intended to give indication of ability to think spatial relations involving three dimensions, a "spatial inference" test employing syllogisms regarding spatial relations, and a learning test based on the substitution principle. D. A. MacMillan proposed the use of tests of perceptual transformation, as contrasted with the more usual performance tests. D. Starch exhibited and described a scale for measuring ability in arithmetic, composed of a series of twelve problems graded in difficulty. Augusta F. Bronner stressed the importance of attitude in relation to performance, with special reference to concrete cases of clinical examination by means of tests. Typical attitudinal factors were enumerated and illustrated. This paper provoked wholesome discussion of the non-rational features of clinical procedure.

A number of papers bore more directly on questions of abnormal and clinical psychology. D. G. Paterson had studied the visual memory for digits of deaf and hearing children, finding the former inferior. The greater the number of years of auditory experience before becoming deaf the greater was the efficiency of the individual. J. E. W. Wallin criticized "the tendency to play fast and loose" with various concepts such as "feeble-minded," and emphasized the many varieties of mental defect. He also gave preliminary results of a census of speech defectives among public school children in St. Louis. S. C. Kohs brought together a large number of cases of mental deficiency in order to present in graphic form their distribu-

tion by mental age and the relation of this distribution to the normal curve of frequency. J. B. Miner advocated a percentage definition of intellectual deficiency and urged more careful description of the border lines of social fitness. Tentative percentage formulæ were proposed and various definitions, coefficients, and boundaries compared with this quantitative expression. S. I. Franz reported cases of recovery of voluntary control in cerebral paralysis, and successful attempts to reeducate several aphasic patients, commenting on the implications of such cases with reference to the function of brain regions and the neural adjustments involved in relearning. After pointing out the unsatisfactoriness of the various theories concerning the etiology of Mongolian idiocy, H. C. Stevens reported an investigation, the results of which suggest that the condition is caused by parental syphilis.

Animal psychology was represented by several papers. K. S. Lashley described the effects of strychnine and caffeine on habit formation (maze learning) in the case of albino rats. A. H. Arlitt has made a similar study of the effects of alcohol, and reported results. H. A. Carr has studied the adaptation of white rats to such factors as degree of hunger, cleanliness of paths, illumination, position of maze and experimenter, handling, etc. R. M. Yerkes described the advantages of a multiple-choice apparatus which makes possible the use of various important methods of procedure in the study of ideational behavior. He also advocated the establishment of an experiment station for the study of monkeys and apes. W. S. Hunter's paper on interference of auditory habits in the white rat reaffirmed the insensitivity of this animal to a certain tone. J. B. Watson had found that delayed feeding seemed to have no effect on rate of learning, and pointed out the important bearing of such results on the "pleasure" theory of learning. H. M. Johnson presented evidence indicating that the dog is not sensitive to gross detail in visual objects.

At the session for general psychology C. A. Ruckmich discussed the present status of psychology as indicated by a quantitative and qualitative analysis of its literature during the last ten years. C. Rahn discussed the definitions of sensation in their historical and systematic aspects. J. R. Angell reviewed the various early and recent criticisms of James's theory of emotion, pointing out that no evidence has yet been brought forward successfully to combat the positive parts of that doctrine. H. S. Langfeld defended the image by the enumeration of situations in which it occurs and by the suggestion of its possible utility. M. Bentley reviewed the psychological antecedents of phrenology and pointed out the influence of Gall on the subsequent doctrine of localized functions. G. V. N. Dearborn

urged psychologists to devote more attention to movement and cœnesthesia as explanatory of mental process.

Most of the remaining papers were on specific experimental problems, some of them having direct educational bearing. K. M. Dallenbach is attempting to measure attention in terms of attributive clearness of cutaneous sensations. G. F. Arps reported a study aiming to determine the efficiency of perception of differences in length of areas, and to analyze the various factors involved in such judgments. M. F. Meyer described an unusual case of color-blindness. J. Peterson described binaural beats as but a shifting of the apparent source of the sound, to be explained on the same principle as is the perception of phase differences. Stella B. Vincent reported the results of the examination of a tongue rendered partially insensitive after loss of the *chorda tympana,* suggesting various explanations. E. K. Strong concludes, on the basis of experimental data, that recognition is based on the ease of nervous discharge over old associational paths, and that this ease is measurable in terms of reaction time. Florence E. Richardson described a dramatic class experiment in perception, in which bystanders, drivers, and traffic policemen estimated the speed of passing automobiles. Cecile White reported the results of studies of the ability to solve a graded series of puzzles, disclosing learning types, individual differences, etc. Helen Clark presented in concrete and objective terms some of the characteristics of a "crowd." J. Jastrow's paper on the study of judgments dealt mainly with individual differences and variability in accuracy, consistency, and confidence in judging varied sorts of material. C. L. Hull described and illustrated the quantitative methods he is using in recording and analyzing the evolution of concepts. M. E. Haggerty, in his analysis of type-writing, is attempting to identify the specific and general habits and to rank them in order of importance for increasing the efficiency of learning. F. N. Freeman is analyzing handwriting coordination of writers of different degrees of development and proficiency, in order to distinguish the characteristics of efficient and inefficient types. Three papers bore on the question of transfer in learning. Freeman is using in this connection a modified form of mirror drawing. H. H. Wylie is using white rats in a problem box. E. A. Cowan is experimenting on the influence of training in concentration on memory for objects. C. T. Gray is studying the differences between good and poor readers, in the endeavor to provide corrective measures for the latter class. H. A. Peterson had measured the effect of reviews under conditions similar to those of school work. G. W. A. Luckey emphasized the importance of properly directed research as a means of teacher training. F. L. Wells stressed the importance of the quantitative study of such significant facts as birth, breeding,

home-environment, education, sexual adjustments, income, and various factors of success—factors which laboratory experiments fail to take into account.

In the symposium on the academic relations of psychology, H. N. Gardiner and R. M. Ogden presented papers on "Psychology and Philosophy"; Max F. Meyer a paper on "Psychology and Science"; C. H. Judd and M. E. Haggerty on "Psychology and Pedagogy." These papers were followed by informal discussion by Swift, Tufts, Dearborn, Ruckmich, White, and others.

The presidential address by Professor John B. Watson, was on "The Place of the Conditioned Reflex in Psychology." The speaker described the nature of the conditioned reflex, its employment in the study of animal reactions, and its feasibility as an instrument in the study of discrimination, learning, and similar problems in the case of the human being. Lantern slides were displayed showing the methods and apparatus in use at the Johns Hopkins laboratory. Brief account was given of a number of studies there under way, in which the conditioned reflex is the principal instrument of research.

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REVIEWS AND ABSTRACTS OF LITERATURE

Buddhist Psychology: An Inquiry into the Analysis and Theory of Mind in Pāli Literature. MRS. C. A. F. RHYS DAVIDS. The Quest Series, edited by G. R. S. Mead. London: G. Bell and Sons, Ltd. New York: The Macmillan Company. Pp. x + 212.

To the long and great work conducted by Dr. T. W. Rhys Davids in opening up the riches of the Pāli Buddhist canon an equal enthusiasm is brought by his pupil and wife, the authoress of this manual—a trifle in size only. Though like her husband placing pure scholarship first, Mrs. Rhys Davids finds time amid the editing of texts for occasional translations and other writings not to be set down as "popularizations," but as interpretations for the non-specialist. It is well that this necessary work be done by one who can write with highest authority.

With all the libraries that have been printed about Buddhism since it first reached the West, it still awaits its rightful place in the histories of the sciences. Jurisprudence, medicine, and the psychology of religious experience could long ago have drawn from it interesting material for comparative studies. As a philosophy it might be taught together with the Greek systems and in the same dispassionate way. Especially important, however, is the contribution that it can make to the history of general psychology, for Buddhism *consists* of psychology, both in its premises and in the dreary lucubrations of its schoolmen. While other religions speculate upon theology, this concerns itself with the mind of man—primarily

what he is not, and incidentally, but very elaborately, what he is. Buddha's chief polemic against the Brahmins was his denial of the *ātman,* or self, an inlet from the ocean of *Atman* or World Soul and thus superior to the laws of causation, evil, and impermanence. Mrs. Rhys Davids suggests that Buddha might have found a place in his system for the soul if it had meant to him only an erant, fluttering sprite according to the classical European notion.

In regarding mind and its properties as ever-changing compounded functions, the Buddhist sages so anticipated many of our recent psychologists that curiosity may well be aroused to compare their theories minutely.

Many persons probably suppose that Buddhist philosophy is idealistic. That is true enough of certain sects, found notably in Japan and influenced perhaps by the Vedānta, but idealism does not rule the primitive doctrines which are held by the Theravāda, or Southern Buddhist school, and are contained in the Pāli canon. Here the natural elements are considered real, although in flux, and the object, if not very substantial, is less unsubstantial than the subject. External things are the "food" or stimuli which cause flashes of intelligence in us. Mind or consciousness after the Buddhist theory is defined by the authoress as "intermittent series of psychic throbs associated with a living organism beating out their coming-to-know through one brief span of life."

Man is divided into five classes of properties and qualities called the *khandhas,* or aggregates. First come the material, *rūpas,* a group wherein are brought together various things more or less concrete, but which a westerner would hardly think of coordinating. Second are the feelings, *vedanās,* comprising the five physical sensations with memory as a sixth; all may be pleasant, painful, or indifferent. Third come the perceptions, *saññas.* The fourth class, *sankhāras,* forms a large and important group. The term is of constant use in Buddhistic literature. It literally means confections or compounds, but practically denotes tendencies or potentialities and includes many kinds of mental activity as against the passive states of consciousness already considered. Fifth is *viññāna,* which must be translated consciousness; its distinction from *saññā* is hazy. To give a full inventory of items under these five heads as they are catalogued in some Buddhist books, although not in this manual, would reveal duplication and confusion, according to our way of thinking, but on the whole an admirable insight and power of analysis.

The *khandhas* as such are discussed by Mrs. Rhys Davids in her chapter on Consciousness. In the preceding one she has studied the different Pāli words for Mind. The chapter on Feeling touches a vital spot in Buddhist philosophy, which is deeply hedonistic, although not in a bad sense. Ramified ways are followed in the two chapters on Ideation, wherein the mysteries of *jhāna,* or ecstatic trance, receive a share of attention.

From early authorities primarily, the authoress has collected her material. About half of her space is devoted to the Nikāyas, homiletical books which fill the Sutta "Basket" of the Pāli canon. A chapter is given to the scholasticism of the Abhidhamma Basket, which the late Professor

Warren, of Harvard, compared to the Desert of Sahara, respectable for immensity; while another is based on the "Questions of King Milinda," a helpful patristic writing. A dictum from the last asserts that animals are capable of reasoned thinking (*yoniso-manasikāra*), but not of insight (*paññā*). Mrs. Rhys Davids elsewhere expresses surprise that Buddhism, for all its sympathetic understanding of animals, has given little study to their psychology.

Finally, comparisons are made with a few medieval developments, notably Anuruddha's Abhidhamattha-sangăha, already published in English by S. Z. Aung and Mrs. Rhy Davids as "The Compendium of Philosophy." This and her "Buddhist Psychological Ethics," translated from the Dhamma-sangani book of the Abhidhamma Basket, should not be overlooked by students of the subject before us.

Buddhist psychology does not recognize the brain as the organ of intelligence, but it postulates a special seat for each of the senses and later commentators have apparently focused these in the heart. There come to mind in this connection two curious passages in the Vinaya Basket (older presumably than the Nikāyas) to which Mrs. Rhys Davids might have alluded. In one of these a boy's parents object to his learning arithmetic lest his breast become diseased. In the other, Buddha's physician Jīvaka removes from a man's head two worms and prevents their reaching the brain, thus recognizing it as a vital region if not the habitat of thought.

"For Buddhists," says our authoress, "the dissolution of the factors of a living individual at death was complete: body 'broke up' and mind, or the incorporeal, ceased. But if, in the final flickerings of mind or *viññana,* there was a coefficient of the desire to enjoy, involving a clinging to, or grasping after life wherewith to enjoy, then those dying pulsations, as cause or condition, *produced their effect,* not in the corpse, but in some embryo wakening elsewhere at that moment to life, it might be in the next house, it might be in some heaven or puratorgy." This is interesting because it explains as a definite telekinetic action that self-reproduction which our Buddhistic students have often perhaps looked upon as more vague in its working.

Besides the scholastic questions to which Mrs. Rhys Davids confines herself in discussing the Buddhist theory of personality is one phase which, for readers of a certain class, should prove far deeper. It shows the possibility of reasoning from the premises of materialistic monism to a belief in immortality. To some thinkers, who have seen no alternative between monistic negations and the difficulties of dualism, to them insuperable, this plea of "confession and avoidance" may be a way of escape. This will, of course, be through suggestion, not through credence in detail. The spirit is thus regarded, not as a flitting bird, but as a force or, we may say, an unspringing seed. Socrates might not have meant this, but he hinted at it when, in the "Phædo," he said that the soul, passing from the body, quickly falls into another and "grows up as if it were sown." Here, after all, we find ourselves coming around to St. Paul's ideas on the grain of wheat; we discover that the Buddhist notion has much in common with the Hebrew doctrine of physical resurrection, as against the usual Greek

concept of discarnate spirit life. That seed, that link in the chain of being which Buddhists call *kamma* (*karma*), seems too slight a thing to carry much individuality, but so does every germ. If there be no continuity of historical memory, still an inferential memory, so to speak, may fill the moral requirements.

The statement of facts regarding Buddhist psychology contained in this review is no epitome of Mrs. Rhys Davids's manual, but is rather the starting-point from which she enters the jungle of ideas. She is a path-breaker rather than a clearer of the ground; no wonder if we find it hard to see the forest for the trees. A reader will lose his way hopelessly unless he enter equipped either with the rudiments of Buddhist philosophy or with such knowledge of general psychology as will enable him to grasp the ideas, aided by Mrs. Rhys Davids's broad scholarship and command of technical language. Elementary students should use the book under guidance. To advantage, the matter might have been more clearly arranged or at least summarized in tables. For lack of this the book may well be read with some simpler account of Buddhist psychology as an introduction. Such is Chapter IV of T. W. Rhys Davids's "Buddhism," a little volume published in London as one of the "Non-Christian Religious Systems" series and not to be confused with his American Lectures of the same title.

As a final judgment, the existence of Mrs. Rhys Davids's new manual removes all excuse hereafter for absence of the Buddhist theory from a place in any curriculum that pretends to set psychology in its historical relations.

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The Social Problem: A Constructive Analysis. CHARLES A. ELLWOOD. New York. The Macmillan Company. 1915. Pp. 225.

On its negative side, "the problem before us is not how to avoid political revolution, but rather how to avoid the decay and disintegration of society itself." Positively speaking, the problem is simply that of "human living together." To this end society must control "heredity, social environment, and personal education." For the first the means is to be found in eugenics. For the second, so far as the economic environment is concerned, the author favors, not socialism, but the intermediate programme of social reforms, including labor insurance, minimum wage, free employment bureaus, "free justice," and, finally, with special emphasis, the scientific reform of taxation, which shall make "findings" rather than earnings carry the main burdens. These "findings" include bequests, the unearned increment in land values, and "speculative profits." In regard to social environment on its spritual side, we must have a "revaluation, in a thoroughly social and humanitarian sense," of family life, government, religion, and morality. For this the author looks chiefly to personal education, which is to stimulate the rational and altruistic sides of human nature and to repress mere instinct and mere egoism. To procure the social organization which will promote these ends we require

trained social experts or efficient social leaders. "The universities produce experts in law and medicine and agriculture and engineering, but experts in the problem of human living together, very rarely; yet these experts are the ones most needed at the present time if western civilization is not to perish through its failure to solve the social problem."

The general tendency of the book is against a material or economic view of the foundations of society,—views which the author calls "negative," because they omit the vital spiritual factor. The work hardly calls for much comment. The titles of chapters raise hopes of a somewhat more specific solution than the author is in a position to furnish. There are stretches of the book in which he is hardly successful in keeping his head above the waters of utter commonplace. The references at the close to trained leaders and to the university as the institution which is to train them interestingly recall the principle laid down in J. S. Mill's early essays, the principle which went so far to shape the whole production of his life, a principle, however, which seems no nearer realization in our time than his. Yet Mill was more specific in the steps he recommended than our author in the present idealistic and amiable volume.

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JOURNALS AND NEW BOOKS

THE JOURNAL OF ABNORMAL PSYCHOLOGY. August–September, 1915. *Constructive Delusions* (pp. 153–184): JOHN T. MACCURDY and WALTER L. TREADWELL. – Three cases are analyzed and an endeavor made "to establish the claim that delusions in dementia præcox which take the form of objective speculations rather than subjective experiences are an evidence of a milder psychotic reaction and hence warrant a prognosis of chronicity rather than deterioration." The "scattering of thought arises from a failure to formulate underlying fancies in an objective way." Insanity of ideas depends "on the critical judgment of the age which produces them," and there are "essential psychological differences between creeds and religious delusions." *Socrates in the Light of Modern Psychopathology* (pp. 185–200): MORRIS J. KARPAS. Socrates is considered the father of psychology and the grandfather of modern psychopathology. Many quotations are made and a bibliography given which illustrate the author's point. "The Socratic conception of the unconscious conforms in many respects with our present knowledge of it, especially in so far as our psychoanalytic experience shows us conclusively what a potent factor is exercised by the unconscious in the determination of psychotic and neurotic phenomena. Indeed in the Socratic sense such manifestations are anti-social and can not be identified with virtue, hence they are not conscious. One may say Socrates unconsciously conceived the modern idea of the dynamics of the

unconscious." *Psychoneuroses among Primitive Tribes* (pp. 201–208): ISADOR H. CORIAT. – To understand clearly the mental traits of Indian tribes as a source from which curious nervous attacks develop, a study of their dreams, their system of taboos, and their myths is made. The dreams of these primitive races strongly resemble the dreams of children. The myths are the savages' day-dreams. The primitive people resemble children, and their attacks of violence or furor are sudden emotional reactions, perhaps hysterical. *Two Interesting Cases of Illusion of Perception* (pp. 209–212): GEORGE F. ARPS. A description of two interesting cases, a boy aged nine and a girl aged six who experience illusions of perception, is presented. *Reviews:* H. H. Goddard, *Feeble-mindedness, Its Causes and Consequences:* W. E. CASTLE. J. B. Hannay, *Christianity: The Sources of its Teaching and Symbolism:* ERNEST JONES. Henri Bergson, *Laughter: An Essay on the Meaning of the Comic* (Translation): ERNEST JONES. *Addresses and Papers at the Opening of the Phipps Psychiatric Clinic, Johns Hopkins Hospital: The American Journal of Insanity,* Special Number, Vol. LXIX, No. 5: MEYER SOLOMON. *Books received.*

Krakowski, Edouard. Les Sources Médiévales de la Philosophie de Locke. Paris: Jouvre et Cie. 1915. Pp. 215.

Mach, Ernest. The Science of Mechanics: A Critical and Historical Account of Its Development. Supplement to the Third English Edition, containing the Author's Additions to the Seventh German Edition. Tr. and annotated by Philip E. B. Jourdain. Chicago and London: Open Court Publishing Company. 1915. Pp. vii + 106.

NOTES AND NEWS

A MEETING of the Aristotelian Society was held on January 6. Lord Haldane delivered an address on "Progress in Philosophical Research." After giving an account of the doctrine of the New Realism and the gain to philosophical inquiry as a result of the discussions it had initiated, he said that those phases of experience which find expression in art, mortality, and religion are as real as the phases of which logical atomism takes account, yet neither logical atomism nor the more comprehensive forms of the New Realism are capable of doing them justice. Preeminently in these higher phases of experience the universal is nothing apart from the particular, and the particular, as such, is, taken by itself, equally unreal. The only real actuality is the individual fact, the essence of which is identity-in-difference. It was one of Hegel's services to philosophy that he strenuously resisted the abstraction of universal from particular, discerned in individuality the form characteristic of the object world, and showed that individuality implies a subject-object relation.

Idealism of the type of which Dr. Bosanquet is a representative, he maintained, approaches the New Realism, but whilst adherents to the latter assert that, like other objects of knowledge, universals are extra-

mental and exist after the fashion of substances apart from the subject-object relation, adherents of the former take them to be aspects within a whole, the conception of which becomes increasingly organized as knowledge extends. It seemed to Lord Haldane that the mind, when it is adequately conceived, evinces itself as that which envelops the world, and not as a thing alongside of other things in that world. If universals are to be thought of as existing in an extra-mental world and apart from mind, then physical reality becomes so transformed from the old-fashioned way of regarding it as to exhibit a logical vitality impossible to dissociate from continuity with a psychical system. Either you throw the work of mind on the shoulders of a physical reality, and thereby transform the latter fundamentally, or you connect it with the nature of mind as living in the contents, and then you have abandoned the doctrine of petrified universals. Your Realism, in short, ceases to be Realism, for Idealism is let into the fortress from the back.

In the discussion which followed Dr. Carr pointed out that there was an ambiguity in the term "mind" as employed by the New Realists. Professor Nunn criticized the address from the point of view of the New Realism stating that while consciousness is in one sense a part of a thing, it is not itself a thing; that it is not the emergence of a new thing. Professor J. A. Smith, on the other hand, argued that it was impossible to suppose that the mind could be regarded as having the character of a thing along with other things. Speaking from the point of view of the New Idealism, Professor J. S. Mackenzie agreed that the emphasis laid upon the subject-object relation was a mistake, that the essential doctrine of Idealism was that all reality must be interpreted by means of universals, and thus it approached the New Realism. Professor Hicks urged that there had emerged from the discussion the mischief of employing such vague terms as idealism and realism in philosophy at all.

THE president of Columbia University has nominated the following professors of the faculty of education to be members of a department of educational research, which department is charged with the work of instruction and research leading to the degree of doctor of philosophy for all candidates for that degree who elect education as their major subject; Professors Russell, McMurry, Monroe, E. L. Thorndike, Sachs, Dewey, and Strayer.

DR. FRANK ANGELL, professor of psychology at Stanford University, has sailed for England to take part in Belgian relief work. During his absence Professor Lillien J. Martin will act as executive head of the department of psychology.

AT Yale University, Dr. Douglas Clyde Macintosh has been advanced from assistant professor of theology in the school of religion to professor of theology.